

REMARKS/ARGUMENTS

Comments: General

I have followed the proscribed procedures of 37 C.F.R. 1.121, Manner of making amendments in preparing my response.

Based on the examiners comments, rejections and objections in Office Response of August 24, 2004 and subsequently of August 5, 2005 the following corrections were made to the patent application as currently published on the USPTO website.

1. Specification

- a) All changes in the specification have been carefully made using the strikeout, underline, and double bracket notations.
- b) The examiner has referenced additional patents, I added references to those patents and added two more recent patents by Furse and myself that have been granted since the application.
- c) Because of these additional patents I expanded on the "Limitations of Prior Art". The list of prior art was expanded to include patents awarded after the date of the original patent application.
- d) I have added a set of definitions to the specification which will enlighten a person who would build the invention.

2. Drawings

- a. As required by the examiner, Figure 1 has been redrawn.
- b. The errors in FIG. 2B and FIG. 3, FIG. 4, FIG. 5, and FIG. 6 have been corrected in a manner according to the examiner's comments in the Office Actions, such as labeling of the "boxes" as microcontroller [13] and signal generator [8]
- c. Names have been added to other non-standard objects, e.g. boxes, in the drawings
- d. Several changes and 5 additions to the list of numbered drawing labels have been made and these numbers and labels have been used in the discussion of the figures.
- e. I have changed and corrected grammatical mistakes noted by the examiner and corrected other grammatical mistakes.

3. Changes to the Claims

a. General

1. The revisions are based on the original claim. The changes from the response of November 24th have been superseded by the current changes.
2. The applicant has reviewed claims to insure that the marked-up copy of the claims accurately reflects the changes made by the amendment.
3. Based on an objection to Claim 2 by the examiner in the original office response (August 24, 2004) I have split Claim 2 into two parts by adding a new independent Claim 43 as a claim for a set of sensors.
4. I have deleted ambiguities and discrepancies in the claims 18,19, 20, 22, 24, 25 and 42.
5. I have withdrawn claims 36 to 41.
6. Claim 43 new, derived in part from Claim 2.
7. No new claims have been added

b. Specific Changes to the Claims

The applicant has reviewed claims 1-16, 18-33, and 42 to insure that the marked-up copy of the claims accurately reflects the changes made by the amendment.

General: Removed markers I, II, III, and IV as requested by the examiner. The line numbers below are assumed from reading the original patent application on the USPTO site.

1. Claim 1 has been amended to remove discrepancies and objectionable material noted by the examiner.

The following are changes and justifications:

Line 1 “diagnostic and prognostic” have been deleted to meet the objection of the examiner

Line 1 “the health status” has been changed to “a health status” to meet the objection of the examiner

Line 1 “conduits” has been changed to “at least one conduit” to meet the objection of the examiner.

Line 4 the text containing the vague and indefinite “central processor” is now changed to read:

“coupled to a central processor ~~coupled~~ by wired or wireless means, the central data processor for ... “

Line 4 “wired or wirelessly” has been added as verbs to define the mode of coupling.

Line 4 “the” has been changed to “a” to correct syntax.

Line 5 “the centralized central data processor” has been changed to “central processor” as suggested by the examiner.

Line 8 bridging line 9: added “each local monitoring device having” before “a local” and deleted “data” before “processor” and

deleted “of each local monitoring device further” after “processor

Line 6 “weighting parameters” has been replaced by “data” (2 instances) at the suggestion of the examiner

Line 7 “local data processor” has been changed to “local processor” as suggested by the examiner.

Line 8 “weighting parameters” has been replaced by “data” at the suggestion of the examiner

Line 9 “the set of weighting parameters” has been replaced by “the set of data” (2 instances) as suggested by the examiner.

Line 10 added “at least one “ to precede “conduit” for consistency in the claims.

Line 10 “weighting parameters” has been replaced by “data” to meet the objection of the examiner.

Line 11 “diagnostic and prognostic health” has been changed to “health” to meet the objection of the examiner.

2. Claim 2 has been amended as follows

a. Claim 2 has been divided to create claim 43.

line 1 Changed “An” to “A” to be syntactically correct as noted by the examiner,

line 4 deleted “conditioning and normalizing” as suggested by the examiner; and

line 6 - deleted “diagnostic” preceding “condition” and,

lines 8 to 19 moved to new claim 43

line 22 added “operational parameters” instead of “operating parameters” as suggested by the examiner; and

line 22 bridging line 23 – as suggested by the examiner,

a. replaced “processes the outputs from the sensors’ with “processes the data from said local set of sensors and strands” and

b. replaced “processed outputs” to “processed data”

c. replaced “the baseline operating parameters” with “previously stored data”, and

d. deleted “diagnostic” before “condition of the conduit”.

3. Claim 3 has been amended:

Line 1 changed reference to claim 43 which was taken from the original text of claim 2; and

Line 1 - At the suggestion of the examiner “sensor set” is changed to “set of sensors”; and

Line 2 - deleted the non-value phrase “but not limited to” (as suggested); and

Line 2 - deleted the reference to “dye” as debris and (residue of dye) have the same meaning in this context.

4. Claim 4 has been amended, and the reasons for changes in Claim 4 are:

Line 1 Added “monitoring” before “device” to provide proper antecedent reference

Line 2 bridging to line 4 - deleted the sentence fragment with to “baseline operational parameters” objected to in the August 24, 2004 Office Action.

5. Claim 5 was amended and the reasons are :

Line 1 - At the suggestion of the examiner “sensor set” is changed to “set of sensors”; and

Line 1 – changed antecedent claim from 2 to 43

Line 2 – added “sensitized medium” after “vibration”

Line 2 bridging line 4 - deleted the sentence fragment with to “baseline operational parameters” objected to in the August 24, 2004 Office Action.

6. Claim 6 was amended and the reasons for changes in Claim 6 are:

Line 1 – replaced “device” with “set of sensors” for proper reference to claim 43; and

Line 1 – changed antecedent from claim 2 to claim 43, and

Line 1 - At the suggestion of the examiner “sensor set” is changed to “set of sensors”; and

Line 2 - deleted reference to “conduit “ because it had no purpose in this claim; and

Line 2 - replaced “sensor” with “sensitized medium” , and

Line 2 bridging line 3 - deleted the sentence fragment with to “baseline operational parameters” objected to in the August 24 2004 Office Action.

7. Claim 7 was amended and the reasons for changes are:

Line 1 replaced claim 2 with claim 43 as the precedent claim; and

Line 1 changed “sensor set” to “set of sensors” as suggested by the examiner; and

Line 2 bridging to line 4 - deleted the sentence fragment with to “baseline operational parameters” objected to in the August 24, 2004 Office Action.8.

8. Claim 8 was amended and the reasons for changes in are:

Line 1 replaced claim 2 with claim 43 as the precedent claim; and

Line 1 changed “sensor set” to “set of sensors” as suggested by the examiner; and

Line 2 bridging to line 4 - deleted the sentence fragment with to “baseline operational parameters” objected to in the August 24, 2004 Office Action.8.

9. Claim 9 was amended and the reasons for the changes are:

Line 1 replaced claim 2 with claim 43 as the precedent claim; and

Line 1 changed “sensor set” to “set of sensors” as suggested by the examiner; and

Line 2 bridging to line 3 - deleted the sentence fragment with to “baseline operational parameters” objected to in the August 24, 2004 Office Action.8.

10. Claim 10 was amended and the reasons are:

Line 1 replaced claim 2 with claim 43 as the precedent claim; and

Line 1 changed “sensor set” to “set of sensors” as suggested by the examiner; and

Line 2 bridging to line 4 - deleted the sentence fragment with to “baseline operational parameters” objected to in the August 24, 2004 Office Action.8.

11. Claim 11 was amended and the reasons are:

Line 1 replaced claim 2 with claim 43 as the precedent claim; and

Line 1 changed “sensor set” to “set of sensors” as suggested by the examiner; and

Line 2 bridging to line 4 - deleted the sentence fragment with to “baseline operational parameters” objected to in the August 24, 2004 Office Action.8.

12. Claim 12 was amended and the reasons are:

Line 1 replaced claim 2 with claim 43 as the precedent claim; and

Line 1 changed “sensor set” to “set of sensors” as suggested by the examiner; and

Line 2 bridging to line 4 - deleted the sentence fragment with to “baseline operational parameters” objected to in the August 24, 2004 Office Action.8.

13. Claim 13 was amended and the reasons are:

Line 1 replaced claim 2 with claim 43 as the precedent claim; and

Line 1 changed “sensor set” to “set of sensors” as suggested by the examiner; and

Line 2 bridging to line 4 - deleted the sentence fragment with to “baseline operational parameters” objected to in the August 24, 2004 Office Action.8.

14. Claim 14 was amended and the reasons are:

Line 1 replaced claim 2 with claim 43 as the precedent claim; and

Line 1 changed “sensor set” to “set of sensors” as suggested by the examiner; and

Line 2 bridging to line 4 - deleted the sentence fragment with to “baseline operational parameters” objected to in the August 24, 2004 Office Action.8.

15. Claim 15 was amended and the reasons are:

Line 1 replaced claim 2 with claim 43 as the precedent claim; and

Line 1 changed “sensor set” to “set of sensors” as suggested by the examiner; and

1) Line 2 bridging to line 3 - deleted the sentence fragment with to “baseline operational parameters” objected to in the August 24, 2004 Office Action.8.

16. Claim 16 was amended and the reasons are:

Line 1 replaced claim 2 with claim 43 as the precedent claim; and

Line 1 changed “sensor set” to “set of sensors” as suggested by the examiner; and

Line 2 bridging to line 4 - deleted the sentence fragment with to “baseline operational parameters” objected to in the August 24, 2004 Office Action.8.

17. Claim 17 was amended and the reason being to remedy the objection of the examiner by:

Line 1 - added “monitoring device” in place of “apparatus” which was vague and indefinite.

18. Claim 18 was amended and the reasons are:

1) The rejection of currently amended Claim 18 has been cleared by:

Line 1 – added monitoring device replacing the vague and indefinite “apparatus” which was objected to by the examiner and

Line 3 - The reference to “diagnostic” and “based on the output signal” have been deleted as indicated by the examiner in the office action of August 24, 2004.

19. Claim 19 was amended and the reasons are:

Line 1 replaced claim 2 with claim 43 as the precedent claim; and

Line 1 changed “sensitized media” to “set of sensors” as suggested by the examiner; and

Line 1 deleted “providing”

Line 2 added “wherein the sensors provide”

Line 2 added “contiguous or branched paths” to replace “the branches” which was objected to by the examiner as vague and indefinite

Line 3 deleted “including, but not limited to, direct current or alternating current electricity, radio waves, audio signals, and beams of light” as being unnecessary.

20. Claim 20 was amended and the reasons are:

Line 1 Replace “sensitized media of” with “sensors of the set of sensors”

Line 1 replaced claim 2 with claim 43 as the precedent claim; and

Line 1 bridging to line 2 added “wherein the sensors” to replace “ in which the signal generators with the signal detectors and the microcontroller processor of claim 3”

Line 4 deleted the phrase “to the insulation material” which was objected to as vague.

21. Claim 21 was amended and the reason were:

Line 1 Replace “sensitized media of” with “sensors of the set of sensors”

Line 1 changed claim 2 to claim 43 as the precedent claim; and

Line 2 added “wherein the sensor is” to provide a verb

22. Claim 22 was amended to answer the examiner’s objection to “the insulation material” which was vague, instead referencing the sensitized media itself.

Line 1 added “sensors of the set of sensors”

Line 1 replaced claim 2 with claim 43 as the precedent claim; and

Line 2 replaced “insulation material” with “sensitized media”

Line 2 replaced “a mixture of dielectrics” with “as least one dielectric”

23 Claim 23 was amended. The reasons for the changes to Claim 23 are:

Line 1 added “sensors of the set of sensors”

Line 1 replaced claim 2 with claim 43 as the precedent claim; and

Line 2 added “wherein the sensitized media is” for reference

Line 2 Removed the reference to “the insulated cores” which is vague and indefinite,

24. Claim 24 was amended. The reasons for changes to Claim 24 were to

Line 1 added “sensors of the set of sensors” to go with reference of claim 43

Line 1 change dependency from claim 2 to claim 43; and

Line 2 replace the vague reference to “on an inner layer of the insulation ” to situation between layer of a multilayered material”

25. Claim 25 was amended. The reasons for changes to Claim 25 are:

Line 1 added “sensors of the set of sensors” to go with reference of claim 43

Line 1 change dependency from claim 2 to claim 43; and

Line 2 remedied the examiner’s objection by deleting the vague “fabricated on the outer surface of the insulation” and replacing with “situated along an outer surface”

26. Claim 26 has been amended. The changes and reasons are:

Line 1 added “sensors of the set of sensors” to go with reference of claim 43

Line 1 change dependency from claim 2 to claim 43

27. Claim 27 has been amended. The changes and reasons are:

Line 1 added “sensors of the set of sensors” to go with reference of claim 43

Line 1 change dependency from claim 2 to claim 43

28. Claim 28 has been amended and the changes are

Line 1 added “sensors of the set of sensors” to go with reference of claim 43

Line 1 change dependency from claim 2 to claim 43

29. Claim 29 has been amended. The changes are:

Line 1 added “sensors of the set of sensors” to go with reference of claim 43

Line 1 change dependency from claim 2 to claim 43; and

30. Claim 30 has been amended and the changes are

Line 1 added “sensors of the set of sensors” to go with reference of claim 43

Line 1 change dependency from claim 2 to claim 43; and

31. Claim 31 has been amended. The changes are:

Line 1 added “sensors of the set of sensors” to go with reference of claim 43

Line 1 change dependency from claim 2 to claim 43; and

32. Claim 32 has been amended. The changes are:

Line 1 added “sensors of the set of sensors” to go with reference of claim 43

Line 1 change dependency from claim 2 to claim 43; and

Line 2 replaced “connectors” with “interfaces”

33. Claim 33 is changed. The changes are:

Line 1 added “monitored by the monitoring device” to remove the ambiguity.

34. Claim 34 is changed. The changes are:

Line 1 added “monitored by the monitoring device” to remove the ambiguity.

35. Claim 35 is changed. The changes are:

Line 1 added “monitored by the monitoring device” to remove the ambiguity.

36. Claims 36 through 41 are withdrawn

37. Claim 42 is amended. The changes are:

Line 1 - deleted “diagnosing and prognosing the” replaced by “assessing a”

Line 7 – replaced “apparatus” with “device” for correct antecedent

Line 11 – deleted the fragment “such as an solid object, gas, liquid, powder or electromagnetic waves” and added “contact” before “said” and added “sensitized” before medium. The reason is that the deleted factors are superfluous

Line 13 – deleted unnecessary “and” between “when and where”

Line 15 - changed “apparatus” to “monitoring device” for correct reference.

Line 15 - added “of the said system of sensors” because that is what is monitored.

Line 16 - added “and” to correct syntax for the steps.

Line 17 and 18 - replaced “couplet” with “tuplet” which the correct expression (couplet is for poetry.)

Line 22 – delete the word “prognostic” objected to by the examiner

Line 24 – deleted the phrase “the information” which was vague and indefinite

Line 24 - deleted the phrase “and prognostic” which was objected to.

Line 25 – changed “the health status” to “a health status” to remove a vague reference

Line 26 – added “components and system” after “conduits” as they are also monitored.

Line 28 – Twice deleted “the characteristics” replacing with “characteristic parameters”

Lines 29 and following - corrected the text about test measurements to read:

[[III]] from time to time performing the same said first test sequence on each of the multiplicity sensitized medium;

making a test measurement for the purpose of determining if said measured - characteristic parameters are substantially equal to previously measured characteristic parameters, the possible outcomes being:

[[a]] there is no measurable change to the sensitized portion of the medium; and

[[b]] there is measurable change to the sensitized portion of the medium; and

[[c]] the medium is disrupted, [[i.e.]] broken, eroded, cut through or dissolved; and

choosing whether to repeat said step of - test measurement of said sensitized medium; and

Line 36 and following: Corrected the last portion to read as follows:

[[IV]] with the digital processor, using a deductive algorithm along with any a priori probability information to:

[[a]] process data from said measuring of said multiplicity of sensitized medium into characteristic information; and

[[b]] determine any change of said - characteristic parameters from - recorded characteristic parameters; and

[[c]] record parameters for later use; and

[[d]] choose whether to measure to locate the change; and

if the choice is to measure then measure using either direct calculation based on the response to the applied signal; or apply a measuring technique -; and record the measured value and temporal information if available; and

using a calculus estimate the degree of damage for each said sensitized media at each recorded point of damage, for each time if temporal information is recorded.

38. Claim 43 is new, and contains text formerly in claim 2 as well as changes that are necessary to explain the nuances of using the set of sensors.

Arguments and Rebuttals

The following are arguments or rebuttals in response to the current office action of August 5, 2005.

A. Claim rejection

With respect to this response to the current Office Action, I have attempted to clear the examiner's rejections to claims by correcting the text in a reasonable manner. I have attempted to remove all vague and indefinite words caused by my use of "the". I believe in so doing that I did not introduce any new matter. The following explains the changes I have made to the claims.

Examiner's Page 3- With respect to Claim 1

Claim 1: I removed the vague and indefinite use of "a central processor" by rewording the text to state that a "central processor" is linked by wire or wireless to the local processors to provide services of data and processing.

Examiner's Page 2 - With respect to Claim 2

Claim 2: I have answered the rejection of Claim 2 by removing the offending references to "conditioning and normalizing" which were not necessary or important.

Examiner's Page 3 - With respect to Claim 37 and 41

Claims 36 through 41 are withdrawn.

Examiner's Page 3 - With respect to Claim 18

Claim 18: I removed the vague and indefinite "apparatus of claim 2" by substituting an appropriate reference.

Examiner's Page 3 - With respect to Claim 19

Claim 19: I removed the vague and indefinite "the branches" by using a different wording.

Claim 19: I removed the offending phrase "but not limited to".

Examiner's Page 4 - With respect to Claim 20

Claim 20: I removed the multiple dependencies (of claim 2 and 43) .

Claim 20: I removed the vague and indefinite terms "the signal generators" and "signal detectors" and "the insulation material" by rewording.

Examiner's Page 4 - With respect to Claim 22

Claim 22: I removed the vague and indefinite term "the insulation"

Examiner's Page 4 - With respect to Claim 24

Claim 24: I removed the vague and indefinite term "the insulation"

Examiner's Page 4 - With respect to Claim 25

Claim 25: I removed the vague and indefinite term "the insulation"

Examiner's Page 5 - With respect to Claim 42

Claim 42: I removed the vague and indefinite terms "the function", "the distributed computers", "the system", "the components", "the readings", "the remaining useful life", "the position", and "the response".

Claim 42: I removed the vague and indefinite "comprising the steps of" with replacement by "the determining comprising" as suggested by the examiner.

Respectfully submitted,

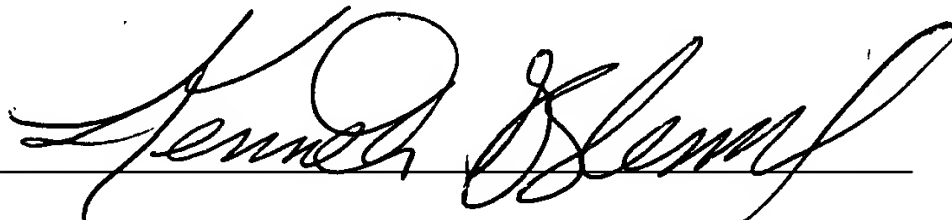
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By

A handwritten signature in black ink, appearing to read "Kenneth Blemel", written over a horizontal line.

Attachments:

Information Disclosure Statement, Item #5

Amended Drawings Replacement Sheets

Appendix A: Response of November 24, 2004 to the office action of August 24, 2004

Appendix A

The following are repeated from the November 24, 2004 response.

My arguments as to why my ideas are unique and valuable and should be granted is based on use and measurement of optical phenomena which are commonly called phosphorescence, luminescence, and incandescence. These phenomena are light that can be visible or invisible to the naked eye. The output spectrum of the optical Phenomena determines which wavelengths must be measured. The following words are now added to the disclosure because I believe they are useful definitions that help to explain the invention and its methods.

I do not claim any particular kind of optical phenomena mechanism, because most of the phenomena are naturally generated and the selection of which phenomena to employ is left to the ultimate user.

One common and widely known technique is to use a photoresistor or photodetector which are semiconductor devices that convert light signals to a voltage or current. The output voltage or current from the photodetector device is integrated, averaged, digitized and otherwise manipulated to provide the measurement parameter.

Review of over a hundred patents found no patent that teaches the use of optical phenomina for inspecting the health of conduits.

There are many patents presented in the disclosure and amendment that use end to end tests usually with electricity (Born, et. al, De Angelis, Boenning, Morris, Watkins, Starke, Baldwin, Khuri-Yakub, Runner, Shanley, May, Johnson, etc.) and some times end-to-end monitoring of light in a conduit to check end to end for continuity (Born).

Use of optical phenomena is consistently missing in prior art. For example, Starke et al US Patent No. 4,480,480 Claim 1 claims use of prestressed light conduits for monitoring physical conditions, using breaking of the light conduit as the means for detecting a structural deformation.

My invention uses a change in a Moire Fringe, or loss of light due to change in radius, or other Optical Phenomena, such as change in spectrum if a prism is used.

None of these patents used measurement of Optical Phenomena other than check to see if a light path is established end-to-end.

It is important to know that one reason for the federal funding of this work was that end to end tests using electricity are sometimes dangerous especially in flammable or explosion prone environments.

My invention in the application did not preclude use of electrically conductive and electrical stimulation. Any energy that causes the optical phenomena is OK. However, my invention does not require use of end-to-end measurement of electricity for detection or diagnostics. In fact, my invention does not require end-to-end measurements at all, as the amount of Optical Phenomena can be measured at one point much the same as reading the pressure on a balloon which is equalized along the surface.

In the specification and in the Preferred Embodiment I added the process control aspects of using stimuli and getting a photometric measurement of the Optical

Phenomena. This is an old concept

Note: my application precluded allowing end-to-end electrical conductivity as used in the art of Bond and others because of concern for safety hazards. The following are from the November 24, 2004 response to the Office Action of August 24, 2004

Examiner's Page 6, Item 9 "Claims 1-41 do not meet the enablement requirement under 35 U.S.C. 112 "

I have responded to this with additional drawings and discussions of how the claims relate to using measurement of Optical Phenomena. I expanded the explanation with definition of technical terms and example(s) in Preferred Embodiment

I think it is fair and just to argue that one skilled in the art of optical physics and/or optical sensors (to which it pertains) can use the Patent disclosure to make create a system described herein – to make use of the invention. (We have confirmed this with at least one outside person skilled in the art of optical physics.).

Question: Is it proper to add an example of each type of sensitized medium?

Response to Specific Rejections

Examiner's Page 6 Item 9 Claim 1 – use of "weighting parameters"

Claim 1 has been reworded to eliminate "weighting factors" from the text, deferring to an adaptation of the wording of Runner's Patent.

I have deleted the weighting parameters and use "calibration transform" more commonly used which is just a linearization formula for accurate conversion to measure values (e.g. inches, pounds, etc.)

Examiner's Page 13, item 12

Rejection of claims 2,4, 7-9, 11, 13, 14, 15, 16, 19, 21-26, 31, 32, 35 and 38 based on U.S. Patent No. 6, 512,444 to Morris, Jr. et al

Regarding Claim 2

Claim 2 has been worded so as not to infringe on the U.S. Patent of Morris et al by not requiring at least one electronic temperature sensor as found in Morris, column 9, lines 13-16, This because we can use an direct optical measurement of temperature reflectance by Gallium Arsenide crystals) and I have modified by claim by not including in my amended claim "having at least one programmed microcontroller" because the optical response can be measured with analog signal (like a VU meter) without programming. The use of a microcontroller will depend on the person who uses the teaching of this patent.

Note: A microcontroller or processor is ubiquitous in today's sensor technologies and has been moved to the preferred embodiment.

I have eliminated reference to baseline parameters range and variance in the preferred embodiment.

[0015] Watkins patent [5,862,030] teaches using a distributed conductive over- temperature sensing portion having a positive temperature coefficient of resistivity which increases with temperature sufficient to result in a switching temperature. Said Watkins' patent also teaches use of electricity with a mechanical damage (chafing) sensing portion comprised of a strip disposed in the sheath in a mechanical damage sensing pattern which like said Born's patent becomes damaged or open upon mechanical damage of the sheath before the bundle of conductors are damaged. ~~Watkin's~~ Watkins' patent does not teach a means to perform detection of mechanical damage without use of an electrically conductive sensor material.

The present invention overcomes the shortcomings of said Watkin's patent by measurement of parameters in electrically non-conductive polymers. Removing the use of electrically conductive polymers for inspection is important because electricity can be a safety concern, especially in fire or explosion prone situations that could be caused by electrical signals.

My patent differs and improves on Watkin's patent by using the measurement of florescent light intensity that does not require a positive temperature coefficient of resistivity.

Arguments in rebuttal of Rejection Due to Prior Art With respect to Morris, et al.

Most important is that the set of sensors of Morris's claims are not based on Optical Phenomena measurement rather that the sensitized media act as transmission lines for transmitting conducted electricity (Morris, column 8, lines 44-60)

Claims 7 9, 11, should not be rejected based on the Morris patent because these claims refer to an optical temperature sensor which is not electrically conductive (we used measuring the Optical Phenomena of change in refraction by a surface of Gallium Arsenide which changes optical characteristics on change of temperature)

Claims 8, 9, 11, should not be rejected based on the Morris patent claims of a temperature sensor, because these claims do not refer to a sensitized medium exhibiting Optical Phenomena that is a temperature sensor, rather a temperature sensor as part of the monitoring device (presumably for purposes of temperature compensation of analytical results, and such as temperature sensor has long been in the public domain.

In addition I argue that my claim 18 should be allowed as the Morris patent does not include a visual indicator.

Examiner's Page 16 - With respect to the U.S. Patent No. 5,245,293 granted Runner

The teaching of using monitoring of the dielectric changes of resistance and capacitance (Abstract) an adhesive bond in not relevant because my claims are for non-electrical measurements based on optical measurement whether adhesively bonded or not.

Examiner's Item 14 beginning on Page 16 – rejecting claims 10, 20, 27, 30, 33, 24 and 36 in view of US Patent 5,245,293 Runner and U.S. Patent No. 6,265,880 Born, et al.

Claims 10, 20, 27, 30, 33, and 24 should NOT be rejected because the sensitized media of these patents is electrically conductive; in particular using measurement of dielectric (capacitance and resistance) properties (Runner and Born).

Further, the Born's inventions Apparatus Claim 8 requires "a means for transmitting and a means for receiving said transmitted optical signal from said medium" (End –to – end test).

With respect to the apparatus of Born and illustrated in Claim 8 – my invention does not require an end to end test and thus does not require a wave guide because the measure of the intensity of light parameter generated by the florescent material (doping) can be done at one end.

Further, my invention does not require use of Time Domain Reflectometry as direct measurement proportional to the light response is used. Until my invention it was not obvious to anyone

The examiner's Item 15, Page 16 Rejecting Claims 3 and 16 based on patents of Shanley, Morris, Runner and Born

Claims 3 and 16 should be allowed because the inventions by Morris, Jr. et al, Runner and Born, as Patented above, even in view of Patent 5,574,213 to Shanley because we specifically use a florescent dye,. With respect to Shanley's patent we only incidentally use the dye as a leak detector, (it might leak), rather our use is a florescent medium whose measured light intensity indicates corrosion, erosion or other damage as either the light leaks outward from the corroded area, or is excited causes effervescent florescence when light spectrum enters inwardly.

Examiner's Item 16, Page 18, Rejecting Claims 5 and 12

Claims 5 and 12 should be allowed to stand without deletion of the use of piezoelectric material (it requires electrical conductivity). My patent does not allow forming of an end-to-end circuit but the piezoelectric discharge given off when touched can excite the photosensitive medium exciting an Optical Phenomena.

Further because the prior art does not include sensing vibration using a "curly fiber" which emits more light the more it changes in amplitude as it vibrates. – and we do not need to use a piezoelectric sensitized medium.

Boenning's Patent is not relevant as it assumes electrical conductivity.

Examiner's Item 17, Page 19 - Rejecting my claims 6 and 28

I submit that my claims (as modified) should not be rejected because my invention, as the examiner states, but Morris and Runner do not include EMI; and the teaching of Born uses conducted electromagnetic waves (column 5, lines 55-56)

My invention claims use of EMI to cause an Optical Phenomena

My invention claims use of electromagnetic waves to excite an Optical Phenomena – e.g. as with Neon gas fluorescing.

My invention performs corrosion / erosion detection by measuring ingress of light through the porosity of the corroded coating which changes the measurement of the light intensity and spectral content depending on the source of the light entering the fiber; or the egress of light through the porosity of the corroded or eroded coating.

Examiner's Item 18, Page 20 Rejection of Claim 29

I deleted reference in my claim regarding reflectometry which is not needed with Optical Phenomena measurement and thus Claim 29 as modified should not be rejected because while Runner, and Born use electrical conductivity required by TDR to locate damage, my invention does not and uses light intensity measurement.

The Patent No. 5,271,274 to Khuri-Yakub uses acoustic waves for conductivity which my claim 29 (as modified) does not, rather my claim is that the acoustic waves are used to excite an Optical Phenomena – using the same mechanism for distortion as caused by stress and strain pressures on a flexible membrane

Examiner's Item 19, Page 21 Rejecting Claims 15, 39, and 40 by reference to US Patent 5,712,934 Johnson

I submit that Claims 15, 39, and 40 should not be rejected because Johnson uses infra-red light (incandescent light) which my invention does not require. Further, Johnson does not teach the use of measurement of induced florescence / phosphorescence of the chemical dope which is a key element of my invention.

The U.S. Patent No. 5,712,934 granted to Johnson disclosed an optical sensor comprising a light source, light detector, and signal generator and an optical fiber extending between the light source and the detector. The optical fiber includes a sensing length comprising a return bend in the fiber, where the return bend has a bend radius less than or equal to 2.5 times the radius of the optical fiber. (Abstract)

My innovation improves on Johnson's patent by:

NOT requiring a return bend in the fiber, because a linear unbent fiber is sufficient, albeit not necessarily unbent.

NOT requiring a fiber between the light source and the detector; because my invention requires a measurement device at one end only.

In one embodiment, my invention DOES NOT require a light source. An ambient light being adequate for inducing phosphorescence emission for measurement.

Further, Johnson requires use of both a transmitter and receiver device for end-to-end measurement, while my apparatus (as documented in amendment) is single ended.

The disclosure of U.S. Patent No. 5,245,293 to Morris, Jr. et al, teaches “a fault sensing electrical wire utilizes one or more sensor strips which provide an impedance change when the wire is subject to over temperature condition or mechanical damage of the wire.” (page 1 Abstract)

The patent claim No 1 line 3 states “ at least one fault sensing electrical wire”. Further that there is at least one (metal wire) sensor strip deposited in the insulation along substantially the length of the wire the sensor strip conductor for diagnostic purposes (column 4, lines 50 – 58),

The claim #1 states the invention requires the sensor having a positive thermal coefficient.

The patent further claims a device comprising at least one programmed microcontroller or other processor for the purpose of acquiring sensor information from a set of sensors and a sensitized medium (column 5, lines 59-64), conditioning and normalizing the sensor information based on parameters and environmental condition of the conduit (column 10, lines 5-15), and for processing normalized information to provide an output signal indicative of the diagnostic condition of the conduit it monitors (column 7, lines 30-33 and 51-53).

Any person familiar with resistive thermal response from electrical current would agree Morris’s patent requires use of electricity.

My invention improves on Morris’s patent by:

a) My invention sensor mechanism is optical response, NOT requiring electrical excitation, the optical response being able to be measured by the output of a photodetector, without direct electrical coupling. The measurement of the intensity of the output (light) signal indicative of the diagnostic condition of the conduit it monitors.

My invention measures the distance from the photodetector to the fault using only intensity of the output (phosphorescent light) signal which is proportional to the distance from the point of test end of the to point of damage.

My invention is able to measure the optical response from a single point.

The disclosure of U.S. Patent No. 6,265,880 by Born et al discloses use of a length of electrical conducting medium (such as a wire) along the outside of a conduit to detect mechanical damage (chafing) using sensors based on a conductive wire, waveguide, fiber optic cable, or a tube that holds a fluid under pressure. (Abstract). Further Born’s patent requires measuring end-to-end integrity of the sensing element.

My invention differs from and improves on the Born et al Patent because it uses phosphorescent / effervescent doping of the polymer fiber, or phosphorescent / effervescent doping of a glass fiber, or phosphorescent / effervescent doped buffer cladding a fiber optic core; specifically a new mechanism that is none of a conductive wire, a waveguide, fiber optic cable, or a tube that holds a fluid under pressure.

Further, my invention does not rely or need a fiber optic cable as a component of the sensor.

Further, my invention does not require end to end measurement, one end being sufficient to measure the strength of the florescent emission.

The disclosure of U.S. Patent No. 4,988,949 by Boenning uses a layer of semiconductor material positioned in surrounding relation for detecting mechanical damage (chafing) on electrical cables against grounded structures under constant electrical signal monitoring using an electrical signal from the semiconductor material (Abstract).

My invention differs from Boenning's patent by teaching a method using optical measurement of intensity florescence rather than Boenning's method of electrical measurement.

Regarding the Conclusions of the Examiner

There is no prior art exploiting use of Optical Phenomena to avoid the use of end-to-end electrical circuits, which represent a hazard in flammable and explosive environments.

My application of 2000 clearly states use of Optical Phenomena by the Words about excitation of optical phenomena.

The lack of prior art in the prior art opens new opportunities exploited by my patent inventions U.S. Patent No. 5,862,030 to Watkins Jr, et al teaches electrical safety device with a conductive polymer sensor.

A reading of the patent clearly states that the polymer is electrically conductive end-to-end. My invention improves on this by removing the safety hazard. (See discussion in the previous section for details.)

U.S. Patent No. 6,392,551 to De Angelis teaches a synthetic fiber cable with a temperature sensor.

A reading of the patent clearly states that an electrically conductive wire is used. (See discussion in the previous section for details.)

U.S. Patent No. 6,286,557 to May teaches a sheath including a sensitized media strip. A reading of the patent clearly states that electrically conductive wires are used. (See discussion in the previous section for details.)

U.S. Patent No. 5,177,468 to Baldwin et al teaches a conduit liner monitor.

A reading of the patent clearly states that the monitor monitors electrically conductive wires. Optical Phenomena are not used. (See discussion in the previous section for details.)

U.S. Patent No. 4,840,480 to Starke et al teaches a light conduit arrangement for monitoring a physical condition of a structural part.

A reading of the patent clearly states that the patent does not teach monitoring conduits, and that monitor monitors using a prestressed light conduit as sensor with end to end measurement with a light source and light receiver). The antecedent Claim 1 requires breaking a light conduit.

Again, Optical Phenomena are not used. (See discussion in the previous section for details.)

Electroactive Polymers 1: Piezoelectric Materials, teaches the common type of piezoelectric materials.

The reference does not consider use of the electricity generated by the piezoelectric material to cause fluorescence which is the purpose in this patent application.